DOCUMENT RESUME

ED 321 533 FL 018 619

AUTHOR Condon, Sherri; Kehler, Andrew
TITLE An X-Bar Account of Noun-Noun Modification.
PUB DATE 89
NOTE 10p.; Paper presented at the Annual Meeting of the Linguistic Society of America (64th, Washington, DC, December 27-30, 1989).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Adjectives; Deep Structure; *English; *Generative Grammar; Language Research; Linguistic Theory; *Nouns; *Phrase Structure; *Structural Analysis (Linguistics)

ABSTRACT

Structures in which nouns modify nouns have raised questions about the form and functioning of generative grammars. By applying and extending Jackendoff's X-bar theory of phrase structure, the syntactic properties of two types of pre-noun modifiers, adjectives and nouns, can be examined. X-bar analysis correctly predicts many features of noun-noun modification structures. It appears that all of the salient properties of adjectives in the attributive position are shared by nouns in the pre-noun position, and that the predictions of the X-bar theory regarding the order of subcategorized modifiers and restrictive modifiers hold in noun-noun modification structures. (JL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED321533

An X-Bar Account of Noun-Noun Modification

Sherri Condon

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

S. Condon

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

BEST COPY AVAILABLE

FL018619

Sherri Condon
University of Southwestern Louisiana

Andrew Kehler
SRA Corp.

An X-bar Account of Noun-Noun Modification

(Presented to LSA Annual Meeting, 1989)

Structures in which nouns modify nouns have raised issues concerning the form and functioning of generative grammars for several decades, particularly since the formulation of the lexicalist hypothesis. On the one hand, their idiosyncrasies in interpretation, pronunciation, and orthographic representation as well as their traditional designation as the word formation process of compounding motivate an analysis in which they are treated as complex lexical items. Under this sort of analysis, any regularities associated with structures in which nouns modify nouns would be analogous to patterns of derivational morphology and, like the regularities associated with derivational morphemes, would exhibit semantic idiosyncrasies and varying degrees of productivity.

On the other hand, some convincing arguments against a purely lexical analysis of these structures have been presented. In particular, Levi (1978) demonstrates that criteria which have been proposed to identify a coherent class of compounds in English are inadequate and yield contradictory results. She also points out that although the semantic interpretation of some of these structures is idiosyncratic, there is considerable regularity that must be accounted for in the grammar. This fact is particularly evident in the class of structures that the present paper is concerned with, which Levi calls predicate nominalizations. In predicate nominalizations, the head noun is derived from a verb and the noun that modifies the head noun is interpreted as bearing one of the thematic roles that can be associated with the verb from which the head noun is derived. The examples in (1) illustrate by associating each noun-noun modification structure with a sentence whose verb is the verb from which the head noun is derived and the modifying noun occurs in a typical position for its thematic relation.

(1)	a.	enemy invasions	(enemies invade X)	[agent]
	b.	heart massage	(X massages hearts)	[theme]
	c.	knife wound	(X wounds Y with a knife)	[instrument]
	d.	UNICEF donations	(X donates Y to UNICEF)	[benefactor or goal]

In (1a), enemy is the agent of the act of invading, while in (1b) heart is the theme. In (1c), knife is the instrument and in (1d), UNICEF is the goal or benefactor. The regularities illustrated in (1) are used to motivate the syntactic analyses of Levi (1978) and Lees (1960, 1970), in which noun-noun modification structures are derived from clausal deep structures by transformational rules. The attractiveness of these analyses is increased if one assumes, as some linguists still do (McCawley 1989), that another type of pre-noun modifier, the attributive adjective, is also derived from a clausal deep structure. Given these two hypotheses, similar processes of clause reduction and preposing would account for the data in (1) as well as the data in (2).

(2)	a.	green apples	(apples that are green)
	b.	honest people	(people who are honest)
	c.	insightful ideas	(ideas that are insightful)

In this paper, it will be demonstrated that the two types of pre-noun modifiers, nouns and adjectives, can and should be analyzed in the same way, though not necessarily using clausal deep structures and transformations. Specifically, it will be demonstrated that recent advances in syntactic theory, especially the development and extension of X-bar theory, now make it possible to

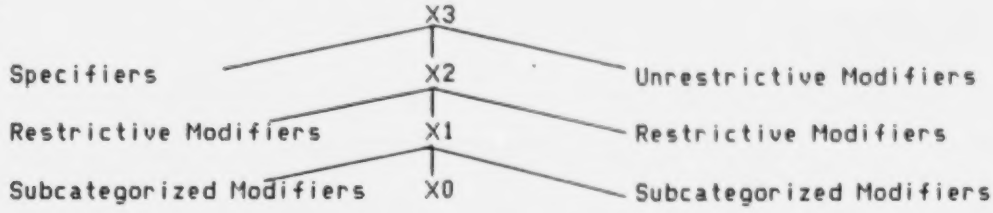
account for syntactic properties of adjectives and nouns that were previously unobserved. Just as there are probably no linguists who would want to propose that adjective-noun sequences like those in (2) should be analyzed as complex lexical items listed separately in the lexicon, there are probably few linguists who would propose that every noun-noun sequence like those in (1) should be analyzed as a complex lexical item. Noun-noun sequences are simply too productive to consider employing separate lexical entries for each one. Only the most productive derivational morphemes, such as the adverb forming -ly suffix, exhibit the generality of noun-noun modification structures. Furthermore, noun-noun modification structures are recursive in the sense that a noun can be modified by many nouns and each of those nouns can be modified by many nouns, yielding monsters like Finin's (1980) example in (3).

(3) port main gear door rear hook operating spring strut plunger

The parallels between attributive adjectives that modify nouns and nouns that modify nouns are numerous. To begin with, the structures are equally productive. The syntactic generalization that adjectives can precede nouns they modify is as robust as the generalization that nouns can precede the nouns they modify. Both structures exhibit unpredictable idiosyncrasies analogous to the idiomatic expressions that are found in other syntactic structures. Thus, the idiosyncratic semantics associated with an expression like ballpark, which is not simply a park for playing ball, but specifically a park for playing baseball, is analogous to adjective noun sequences like honest women, which is not simply a woman who is honest, but one who is not a prostitute.

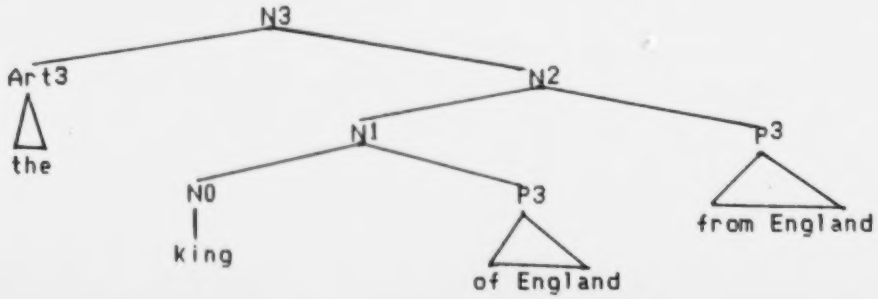
Even more convincing evidence of the similarity of noun and adjective modifiers utilizes insights gained from X-bar theory. Linguists are familiar with Jackendoff's (1977) hypotheses about the structure of modifiers in English, which can be illustrated as (4).

(4)



Actually, (4) is a modified version of Jackendoff's ideas, since he uses slightly different terms for the different types of modifiers and he also assumes that some specifiers occur as daughters of X2. To illustrate the differences between restrictive modifiers and subcategorized modifiers, Jackendoff (1977:59) gives the example in (5).

(5)



As evidence for distinguishing the two types of modifiers, Jackendoff observes that the pronoun one can replace both the head noun and the subcategorized complement, as in (6a), but not the head noun apart from the subcategorized complement, as in (6b).

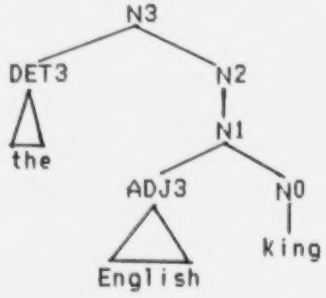
(6) a. The king from France is taller than the one from England.
b. *The king of France is taller than the one of England.

Furthermore, Jackendoff's hypothesis correctly predicts that subcategorized modifiers must occur closer to the head noun than restrictive modifiers, as illustrated in (7).

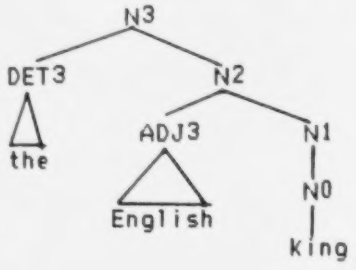
(7) a. A king of England from France ruled after the Norman invasion.
b. *A king from France of England ruled after the Norman invasion.

Although Jackendoff has very little to say about attributive adjectives, Hornstein & Lightfoot (1981) extend his analysis to attributive adjectives by pointing out that X-bar theory makes it possible to treat the ambiguity of phrases like the English king as structurally ambiguous. The phrase can have either the structure in (8a) or the one in (8b).

(8) a.



b.



In (8a), where the adjective is a daughter of N1, the phrase is interpreted as "the king of England" analogous to the king of England structure in (5), where of England is a daughter of N1. In (8b), where the adjective is a daughter of N2, the phrase is interpreted as "the king from England" analogous to the king from England structure in (5), where from England is a daughter of N2. Since a king is usually from the country that he is king of, it is difficult to apply the one replacement test to this phrase. The analysis predicts that "the English one" in (9a) should be interpretable only as "the king from England" rather than "the king of England", but the two readings are difficult to discriminate.

(9) a. The French king is taller than the English one.
b. The people will not stand for a French English king.

However, (9b) demonstrates that another prediction of the analysis is clearly correct. Because subcategorized modifiers must be closer to the head than restrictive modifiers, we predict that the phrase "French English king" is interpretable only as a king of England from France. An interpretation of the phrase as a king of France from England would place the subcategorized modifier at the periphery and the restrictive modifier closer to the head. Judgments conform strongly with the predictions of the X-bar analysis.

Having demonstrated that attributive adjectives can be restrictive or subcategorized modifiers and conform to the predictions that X-bar theory makes

about those modifiers, we can now turn to the noun modifiers of nouns. Although most of the data that will be presented here uses nominalizations, we can begin with some examples in which the head noun is not derived from a verb. The noun book subcategorizes for an of-phrase, which typically must be included in the antecedent of one, as illustrated in (10).

(10) a. The books of poetry with romantic themes tend to be longer than the ones with tragic themes.
b. *The books of short stories sell better than the ones of poetry.

(10a) demonstrates that a non-subcategorized restrictive modifier need not be included in the antecedent of one, unlike the subcategorized of phrase in (10b).

It is also possible for the object of the of phrase to precede book in a noun-noun modification structure, as illustrated in (11a).

(11) a. The short story books sell better than the poetry books.
b. *The short story books sell better than the poetry ones.
c. However, the 1989 poetry books are selling better than the 1988 ones.

(11b,c) demonstrate that in the pre-noun position, the subcategorized modifier must be included as the antecedent of one, as in (11c) and cannot be excluded, as in (11b). The data also illustrate that nouns which occur in non-subcategorized relations with the head can be excluded from the antecedent of one, as 1988 is in (11c). Another prediction that can be tested with the phrase 1989 poetry books is the prediction that subcategorized modifiers must occur closer to the head than non-subcategorized modifiers. Clearly, the phrase poetry 1989 books, in which the order is reversed, is impossible.

We have demonstrated that noun-noun modification structures conform to the predictions of an X-bar analysis even when they are not nominalizations. Consequently, it appears that our hypothesis can be extended to include structures that are not nominalizations. We are currently restricting the hypothesis to nominalizations because the subcategorization properties and thematic structures of verbs are much better understood than those of nouns. Levi (1978) distinguishes four types of predicate nominalizations: acts, which she illustrates with examples like (12a), products, which she illustrates with examples like (12b), agents, which she illustrates with examples like (12c), and patients, which she illustrates with examples like (12d).

(12) a. dream analysis (the act of analyzing dreams)
b. oil imports (that which is produced by the act of importing oil).
c. mail sorter (x such that x sorts mail)
d. student invention (y such that students invent y)

She further divides noun-noun modification structures that are nominalizations into subjective ones, in which the modifying noun is the subject of the nominalized clause like (12d), and objective ones, in which the modifying noun is the object of the nominalized clause like (12a-c). Only the act and product nominalizations can occur in both subjective and objective structures. The agent nominalizations cannot occur in subjective nominalizations because the result of the nominalization itself expresses the subject of the clause. For example, mail sorter can be related to the clause mail sorters sort mail. Similarly, the patient nominalization itself expresses the patient or theme of the clause and cannot occur in objective modification structures. For example, student inventions would be related to the clause students invent student inventions.

Our strategy has been to investigate all the types of predicate nominalizations that Levi identifies to determine whether they conform to the predictions of X-bar theory. We will proceed by comparing structures in which the components of the nominalized clause are expressed as right modifiers to structures in which the components of the nominalized clause are expressed as left modifiers in noun-noun modification structures. Our first observation is that constituents representing agents and instruments seem to behave indentically in both the right modifier and left modifier structures. Consider the data in (13).

(13) a. The city acquires land.
b. acquistion of land by the city
c. city land acquistion
d. *The acquistions of drillings rights are going faster than the ones of land.
e. The acquisitons of land by the city are larger than the ones by the state.
f. *The drilling rights acquistions are going faster than the land ones.
g. The city land acquisitons are going faster than the state ones.

The clause in (13a) can be nominalized with right modifiers as in (13b) or with left modifiers as in (13c). (13d) illustrates that in the right modifier structure, the nominalized predicate alone cannot be pronominalized as <u>one</u>, though the predicate plus theme can be pronominalized, as in (13e). (13e) also shows that the <u>by</u> phrase representing the agent need not be included as the antecedent of <u>one</u>. The examples in (13f) and (13g) parallel (13d) and (13e) except that the noun-noun modification structures are used. Since (13) is an act nominalization, (14) presents a similar example in a product nominalization.

(14) a. The government supports prices.
b. supports of prices by the government
c. government price supports
d. *The supports of insurance rates are greater than the ones of prices.
e. The supports of prices by governments are greater than the ones by industries.
f. *The insurance rate supports are greater than the price ones.
g. The government price supports are greater than the industry ones.

(15) presents similar examples in which the subject of the nominalized clause is an instrument rather than an agent.

(15) a. Machines translate poetry.
b. translations of poetry by machines
c. machine poetry translations
d.?*The translations of technical material are better than the ones of poetry.
e. The translations of poetry by machines will never be as good as the ones by human beings.
f. *The technical material translations are easier than the poetry ones.
g. The human poetry translations will always be better than the machine ones.

In all of these examples, the judgments of the ungrammatical noun-noun modification structures actually seem to be stronger than the judgments of the ordinary nominalizations.

As predicted by X-bar theory, the order of constituents in the nominalizations cannot be reversed. (16a,b) reverse the order of (13b,c) respectively, (16c,d) reverse the order of (14b,c) respectively, and (16e,f) reverse the order of (15b,c) respectively.

(16) a. *acquisitions by the city of land
b. *land city acquitions
c. *supports by the government of prices
d. *price government supports
e. *translations by machines of poetry
f. *poetry machine translations

The structures in (16a,c,e) are acceptable only if the NP objects of <u>of</u> are made much heavier. Consequently, to the extent that they are grammatical, they are also a result of some sort of rightward movement akin to heavy NP shift.

Therefore, constituents expressing the agent and instrument of the nominalized clause tend to behave like restrictive or adjunct modifiers. (17) presents an act nominalization in which a theme and locative modifier are expressed.

(17) a. X purchases stock in New York
b. purchases of stock in New York
c. New York stock purchases
d. *The purchases of stock were higher than the ones of bonds.
e. The purchases of stock in New York were higher than the ones in Chicago.
f. *Stock purchases were higher than bond ones.
g. New York stock purchases were higher than Chicago ones.

The data in (17) parallel the data in (13) - (15) except that non-theme modifier is a locative adjunct of the nominalized predicate rather than the agent or instrument. (18) demonstrates that similar facts hold for time adjuncts, this time with an agent nominalization.

(18) a. football players played football in 1989
b. players of football in 1989
c. 1989 football players
d. *The players of football made more money than the ones of baseball.
e. The players of football in 1989 made more money than the ones in 1988.
f. *The football players made more money than the baseball ones.
g. The 1989 football players made more money than the 1988 ones.

(19) illustrates that that the predictions of X-bar theory regarding the order of these constituents hold.

(19) a. *purchases in New York of stock
b. *stock New York purchases
c. *players in 1989 of football
d. *football 1989 players

(19a,b) reverse the order of (17b,c) respectively and (19c,d) reverse the order of (18b,c) respectively. The results are clearly ill-formed. The similarities of agent/instrument constituents and restrictive/adjunct ones are interesting and are probably related to the fact that unlike other thematic roles, the agent and instrument roles can be expressed as subjects in simple active declarative

sentences. It was Huang (1982) who first observed the similarity of adjuncts to subjects with respect to ECP effects and recent work has focused on the subject as an external argument (Williams, 1981; Chomsky, 1986; Grimshaw, 1988). It is likely that these facts are all related. However, Jackendoff (1977) also observes that not all subcategorized complements must be included as the antecedent of one, so there is a great deal more work to do to understand the facts of one pronominalization.

An additional correct prediction of X-bar theory with respect to noun-noun modification structures concerns the adjunct, or restrictive, modifiers. Although Jackendoff's schema in (4) establishes strict dominance relations between these modifiers and subcategorized complements, no precedence relations among restrictive modifiers are established. It is predicted that there should be no strong preferences for the ordering of two or more adjunct constituents and (20) suggests that this prediction is correct.

(20) a. purchases of stock in New York in 1989
b. purchases of stock in 1989 in New York
c. 1989 New York stock purchases
d. New York 1989 stock purchases

There seems to be no preference regarding the order of the locative and time adjuncts in either the right modifier or left modifier structures.

It should be pointed out that the conformity of noun-noun modification structures to the predictions of X-bar theory has been observed by Radford (1988). However his investigation of nominalizations is not as thorough as the one presented here, so he does not observe the similar behavior of agent and instrument constituents and adjunct constituents. Furthermore, he fails to point out the other striking similarity between pre-noun modifiers that are nouns and those that are adjectives. It is well-known that the modifier structure of adjectives in attributive position is impoverished compared to adjectives in predicate and post-noun position. Specifically, no right modifiers occur with adjectives in attributive position. Similarly, one fact that has undoubtedly motivated the treatment of noun-noun modification structures as complex lexical items is the non-occurrence of typical right modifiers with the modifying noun. However, it appears that a failure to link the lack of right modifiers of attributive adjectives and the identical lack of right modifiers of nouns in pre-noun position would be a failure to capture a significant generalization. This idea is further motivated by a consideration of the restrictions on left-modifiers of nouns and adjectives in pre-noun positions. Both can occur with typical pre-modifiers: just as adjectives can be modified by intensifiers like very in attributive position, nouns can be modified by adjectives in pre-noun position, yielding structures like large city unclaimed land acquisitions. However, typical specifiers of both adjectives and nouns cannot precede these constituents when they occur in pre-noun position. Therefore, we do not find structures like the so pretty flowers or those the land acquisitions.

Consequently, we have observed that all of the salient properties of adjectives in attributive position are shared by nouns in pre-noun position. Furthermore, the predictions of X-bar theory regarding one pronominalization as well as the order of subcategorized modifiers and restrictive modifiers hold in noun-noun modification structures. Much remains to be understood about noun-noun modification, but the observations presented here suggest a productive approach to the problems.

Works Cited

Chomsky, N. (1986) Knowledge of Language: Its Nature, Origin, and Use. New York: Praeger.

Finin, T. (1980) The Semantic Interpretation of Compound Nominals. Doctoral dissertation, University of Illinois.

Grimshaw, J. (1988) Adjuncts and Argument Structure. Lexicon Working Paper #21, Center for Cognitive Science, MIT.

Hornstein, N. & Lightfoot, D. (1981) Explanation in Linguistics. London: Longman.

Huang, C.-T. J. (1982) Logical Relations in Chinese and the Theory of Grammar. Doctoral dissertation, MIT.

Jackendoff, R. (1977) X Syntax: A Study of Phrase Structure. Cambridge, Mass.: MIT Press.

Lees, R. B. (1960) The Grammar of English Nominalizations. Indiana University Research Center in Anthropology, Folklore, and Linguistics Publication No. 12.

_____. (1970) Problems in the Grammatical Analysis of English Nominal Compounds. In Bierwisch, M. and S. Heidolph, eds. Progress in Linguistics. The Hague: Mouton, 1970.

Levi, J. N. (1978) The Syntax and Semantics of Complex Nominals. New York: Academic Press.

Radford, A. (1988) Transformational Grammar: A First Course. Cambridge: Cambridge University Press.

Williams, E. (1981) Argument Structure and Morphology. The Linguistic Review, 81-114.